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SITE INSPECTION REPORT
HUBERT WHEELER STATE SCHOOL
ST. LOUIS CITY, MISSOURI

September 20, 1994

Missouri Department of Natural Resources

Hazardous Waste Program



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Prepared By

A handwritten signature in cursive script, reading "Julie A. Bloss".

Julie A. Bloss
Environmental
Specialist

Reviewed By

A handwritten signature in cursive script, reading "James L. Kavanaugh".

James L. Kavanaugh
Chief, Site
Evaluation Unit

Approved By

A handwritten signature in cursive script, reading "Gary T. Behrms".

Gary T. Behrms
Chief
Superfund Section

30803319



Superfund

DATE: September 20, 1994

PREPARED BY: Julie A. Bloss
Missouri Department of Natural Resources

SITE: Hubert Wheeler State School
City of St. Louis, Missouri

CA NO: V007587-02-0

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1. INTRODUCTION

Under the authority of the CERCLA (Comprehensive Environmental Compensation and Liability Act) and the SARA (Superfund A Reauthorization Act of 1986), the MDNR (Missouri Department of Natural Resources) through a cooperative agreement with the EPA (U.S. Environmental Protection Agency), conducted a SI (site inspection) at the Hubert Wheeler State School. The purpose of this investigation was to collect information on the site sufficient to assess the threat posed to human health and the environment, to test PA (preliminary assessment) hypotheses and to determine the need for additional investigation under CERCLA/SARA or other action. The scope of this investigation included review of available file information, a comprehensive source survey, a comprehensive target survey, site reconnaissances (October 7, 1993 and January 12 and June 14, 1994) and site sampling on July 7, 1994.

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2. SITE DESCRIPTION, OPERATIONAL HISTORY AND WASTE CHARACTERISTICS

2.1 Location

The Hubert Wheeler State School site is located in the City of St. Louis, southeast of the intersection of I-44 and Hampton Avenue. The site can be entered by following Hampton Avenue south to Wilson Avenue, then east on Wilson Avenue for several blocks. The site is located on the north side of the street, at 5707 Wilson Avenue. This location is approximately one mile south of Forest Park (Reference 4). If normal survey sections are projected into this area, the location would be in the south half of section 19, T45N, R7E (Reference 31, page 1). The geographic coordinates of this location are 38° 35' 26.76" N latitude and 90° 17' 51.48" W longitude (References 3 and 4; Figure 1).

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The City of St. Louis is characterized by climate of cold winters and long, hot summers. In summer, the average daily temperature is 77°F; in winter, 33°F. The average relative humidity in the midafternoon is 60 percent. Total annual precipitation for the area is 33.8 inches. The prevailing wind is from the south (Reference 6, page 2). The two-year 24-hour rainfall for this area is 3.5 inches (Reference 26). Average windspeed, 12 miles per hour, is highest in March (Reference 6, page 2).

2.2 Site Description

The Hubert Wheeler State School for severely developmentally disabled students is located at 5707 Wilson Avenue in St. Louis, in a mixed commercial and residential area. This school formerly had a student enrollment of 110 and 54 faculty members (Reference 8, page 14; References 25 and 41). Six administrative staff members for the State Schools for the Severely Handicapped also have offices in the building (Reference 41).

This area was mined for coal and clay beginning in the middle part of the 19th century. Areas nearby the site were used for landfiling operations (Reference 31, page 1). A tar-like substance has "bubbled up" from the ground every spring since the school opened, in 1970 (References 30 and 39). The area of greatest contamination appears to underlie the asphalt playground of the school (References 7, 43 and 44), which is 72.5 feet by 101.5 feet in size (Reference 39). Cracks and fissures are visible in the asphalt surface, which may expose the students and staff of Hubert Wheeler State School to soil and air contamination (Reference 22).

2.3 Operational History and Waste Characteristics

•Operational History•

From 1907 to 1959, site ownership included the Laclede Fire Brick Manufacturing Company, the Laclede-Christy Company, and the H.K. Porter Company (now the Quaker Rubber Corporation) (Reference 7, page 15; Reference 46). The Laclede Christy Clay Products Clay Mine was present on both the 1903 and 1926 Sanborn maps near the Hampton/Wilson Avenue intersection (Reference 36). Building and occupancy permits indicate that from 1950 to 1967, warehouse facilities were used by the St. Louis Coke & Foundry Supply as a storage area. The coke and foundry supply constructed a warehouse in 1960 to store VMP naphtha (Reference 7, pages 15-16; Reference 46).

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Aerial photographs indicate that demolition landfilling operations began north and west of the site in 1960. By 1969, the buildings previously located north of the site had been razed (Reference 7, pages 15-16; Reference 46). The State of Missouri's Department of Education purchased the Wilson Avenue property in 1968 (Reference 41). A tar-like substance has "bubbled up" from the ground every spring since the school opened, in 1970 (References 30 and 39).

In October 1990, DESE (Department of Elementary and Secondary Education) used a backhoe to excavate an area next to the asphalt playground, with the purpose of removing the material and determining the depth and extent of the tar-like substance. At a depth of four feet, an eight foot wide, nine inch thick solid horizontal vein of coal tar was reportedly detected moving parallel to the soil surface (Reference 39). A concrete walkway was installed in 1990 by DESE. At that time, at least one barrel was unearthed (References 7 and 30).

A sample of the tar-like substance was collected at this time, but the sampling results for polynuclear aromatic hydrocarbons were inconclusive. The sample contained 859 ppm total lead, but was below (.3 ppm TCLP lead) the RCRA (Resource Conservation and Recovery Act of 1976) regulatory limit of 5 ppm TCLP lead (Reference 34, pages 4-6). Based upon these results, DESE disposed of the materials derived from this investigation as a special waste (Reference 39).

Geotechnology was hired by DESE to conduct a subsurface assessment of the asphalt playground at the Hubert Wheeler State School in 1993 (Reference 39). MDNR was first notified of the site on February 2, 1993 when the consultant contacted MDNR to discuss remedial options for the asphalt playground (Reference 9).

Geotechnology conducted soil sampling as part of a Phase I subsurface assessment in August 1993. Ten soil borings were collected from a depth of approximately ten feet from the asphalt playground. Results of this sampling indicated that levels of several carcinogenic semi-volatile organic compounds were present in the soil at levels that exceeded the Missouri Department of Health's (MDOH) recommended Any-Use Soil Levels (ASLs) (References 7 and 44; **Table 1**).

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MDNR conducted a site visit on October 7, 1993. At that time, the tar-like material was not observed to be flowing over the asphalt surface. Two drums were observed in a trash dumpster on-site (Reference 22). The consultant reported that the drums contained rinsate water and drill cuttings. The drill cuttings were treated as a special waste and hauled to a landfill. The rinsate water was discharged into a sewer under a permit from the St. Louis Metropolitan Sewer District (Reference 7, pages 4-7; Reference 11).

In December 1993, after receiving the results obtained during the Phase I sampling conducted by Geotechnology for DESE, MDNR in concurrence with MDOH recommended that access to the asphalt playground be restricted to personnel involved in the hazardous substance assessment and remediation projects (References 27 and 28).

A second site reconnaissance was conducted by MDNR on January 12, 1994 (Reference 30). Later that same month, the existing ten foot chain-link fence segments were removed from the northern and southern edges of the asphalt playground. A twelve foot chain-link fence was installed which fully encloses the asphalt playground and some of the surrounding grassy areas (Reference 39).

DESE held a meeting regarding the playground remediation for concerned parents and staff on May 19, 1994 (Reference 39). Six parents and about 20 staff members were in attendance (Reference 37).

Geotechnology's Phase II sampling plans included surface soil sampling, infrared thermography, a magnetometer/gradiometer survey, a ground penetrating radar survey, and test pit excavation (Reference 35). Geotechnology modified their Phase II site investigation after receiving comment from MDNR to include containerization of investigation-derived waste and possible additional sample collection (Reference 33). MDNR coordinated site inspection sampling events with Geotechnology to minimize disruption to school operations.

Geotechnology conducted a magnetometer survey on June 30, 1994. MDNR was on-site to observe (Reference 37; **Photo Log**). Infrared thermographic and ground penetrating radar surveys were conducted by DESE's consultant in July of 1994. The combined observations of these surveys indicate several suspected anomaly areas in the vicinity of the asphalt playground (Reference 44).

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The MDNR site inspection sampling plan was completed on July 5, 1994 (Reference 38). MDNR site inspection sampling was conducted on July 7, 1994 (Reference 32; **Tables 2a and 2b**). At this time, DESE's consultant also collected ten surficial soil samples (Reference 44; **Table 1**).

Members of DESE, MDOH, Office of Administration (OA), Geotechnology (DESE's consultant), and MDNR met to discuss these findings on August 10, 1994. MDOH and MDNR recommended that access to the surficial soils outside the fenced area also be restricted. MDNR and MDOH also suggested conducting air monitoring and taking dust samples from inside the school (Reference 44).

DESE decided to close the school on August 12, 1994, informing the parents of the students by letter (Reference 42). A press release was issued on August 19, 1994 (Reference 40 and 41). Students and staff members of Hubert Wheeler State School have been temporarily re-assigned to the Gateway State School for Severely Handicapped and at the Missouri School for the Blind. Six administrative staff members are still working on-site (Reference 41).

Suspected sources of contamination may include the coke and foundry supply storage areas formerly located on or near the site and any demolition landfilling areas (Reference 7, pages 15-16). Additional sources of contamination may include two former manufactured gas plant sites near the area, the Carondelet Coke Company and the Laclede Shrewbury Plant (Reference 21). Coal tar processors were found in the vicinity of larger manufactured gas works and coal tar residuals were often transported between locations (Reference 29). An area of surfacing tar was previously recorded in the St. Louis area in 1982 (Reference 31, attachment page 16). This location, along Lexington Avenue in Handy Park, is 3.5 miles northeast of the site (Reference 4). The origin of this tar waste was undetermined (Reference 31, attachment page 16).

Waste Characteristics

VMP naphtha, or varnish makers' and painters' naphtha, is a moderately toxic mixture of petroleum distillates, which may include mineral spirits, ligroin, and refined solvent naphtha. All of these solvents are more volatile than kerosene but share its toxic potential (Reference 45, page II-156).

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PAHs (polynuclear aromatic hydrocarbons) are a group of chemicals that are formed during the incomplete burning of coal, oil, gas, or other organic substances (Reference 47, page 1). Several of the PAHs, including benzo(a)pyrene, have been shown to be carcinogenic. Studies of PAHs have been shown to have harmful effects on the skin, body fluids, immune system and reproductive system of some animals. These effects have not been reported in humans (Reference 47, page 4). PAHs or their breakdown products can be measured in urine, blood, or body tissues. However, although tests can show if you have been exposed to PAHs, these tests can not be used to predict if any health effects will occur (Reference 47, page 5).

3. WASTE/SOURCE SAMPLING

Geotechnology conducted Phase I air monitoring and soil sampling in June of 1993, and followed with surficial soil sampling in July of 1994 (References 7 and 44). MDNR collected site inspection soil samples on July 7, 1994 (Reference 43). Based upon previous sampling conducted by Geotechnology and the history of the site, all MDNR site inspection samples were analyzed for volatile organics, base neutrals and acid extractables, and total metals (Reference 38, page 2).

3.1 Sampling Locations

MDNR collected seven samples from the Hubert Wheeler State School site on July 7, 1994. One of these samples was a grab of the tar-like substance from where it has oozed up from the subsurface. Four samples were collected from the soils on the western side of the school, in the vicinity of the asphalt playground. Soil samples were collected to the northwest (1 sample), west (1 sample), and east (2 samples) of the asphalt playground. Two soil samples were collected from the eastern side of the school, one from the grass play area, and one slightly further southeast. All MDNR soil samples were collected from the top two feet of soil (Reference 43; **Table 2a; Figure 3**).

3.2 Analytical Results

Both Phase I and Phase II sampling results collected by Geotechnology for DESE indicated that carcinogenic polynuclear aromatic hydrocarbons (PAHs) are present in the soils in the vicinity of the asphalt playground of the school (References 7 and 44). The highest levels of contamination were detected in borings collected from the southeastern quadrant of the asphalt playground, near the concrete walkway (Reference 7, pages 22 and 24). Six PAHs which the Missouri Department of Health considers to be carcinogenic were found at levels above 1993 MDOH recommended

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Any-Use Soil Levels in samples collected from both the top six inches of soil and at depth (References 7 and 44; **Table 1**).

MDNR site inspection sampling results are presented as **Table 2b**. The highest levels of contamination were found to be present in the sample of the tar-like substance. Concentrations of contaminants found in this sample at values exceeding both three times background and exceeding Superfund PA/SI site screening standards include: fluoranthene (47,000 ppm), pyrene (28,000 ppm), and benzo(a)pyrene (32,000 ppm). One soil sample exceeded the Superfund PA/SI site screening standard of .08 ppm benzo(a)pyrene. This sample, collected nine feet west of the western edge of the asphalt play area, contained 2 ppm benzo(a)pyrene (References 2 and 43; **Figure 3**).

3.3 Conclusions

Sampling results indicate that carcinogenic polynuclear aromatic hydrocarbons (PAHs) are present in the soils underlying the asphalt playground and surrounding areas of the school (References 7, 43 and 44). The highest levels of contamination have been detected in borings collected from the southeastern quadrant of the asphalt playground, near the concrete walkway (Reference 7, pages 22 and 24). Cracks and fissures are visible in the asphalt surface, which may have allowed for human exposure to the contamination (Reference 22).

4. GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

A layer of silty clay loess covers the uplands in this area. This unit is not known to produce water in this area, and is generally believed to be too clayey to produce a usable quantity of water (Reference 31, pages 1 and 2).

Shales, clays, sandstones and coals of the lowest Cherokee Group (Pennsylvanian) underlie the loess. The Pennsylvanian rocks of the St. Louis area are relatively impermeable and yield very little water to wells. An exception to this may be the possible production of water from mine voids, where the potential yield has been artificially enhanced (Reference 31, page 2).

The aquifer of concern at this site is made up of a sequence of limestones of various compositions, ranging from clayey to sandy to cherty. These limestones are Mississippian in age. This system includes, in descending order: the Ste. Genevieve

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Limestone, St. Louis Limestone, Salem Formation, Warsaw Formation, Burlington-Keokuk Limestone, Fern Glen Formation, and the Chouteau Group. Thin shales in this sequence are not considered reliable aquitards. Thin shales, sandstones and limestones of the Devonian and Silurian Systems may also be present at a depth of approximately 775 to 800 feet. The shallowest reliable aquitard in the Maquoketa Shale at the top of the Ordovician System. Its depth is estimated at 810 to 820 feet. Below this depth, groundwater is expected to be too mineralized to be potable. Mineralized groundwater probably occurs at shallower depth. Yields of fresh water from the Mississippian are expected to be small (Reference 31, page 2).

Mining occurred within the Pennsylvanian bedrock. The void space produced is near the top of the Mississippian aquifer, providing aquifer interconnections with the surface (Reference 31, page 2). There is a possibility of infiltration of River des Peres through the surface exposures of Mississippian limestone downgradient of the site (Reference 10, page 3).

The Ste. Genevieve, St. Louis, Salem, and Burlington-Keokuk formations all exhibit karst features within the St. Louis area where they occur near the surface. Sinkholes are present less than two miles southwest of the site and are in an area where the Ste. Genevieve Limestone directly underlies surficial soils. Topographic depressions nearer to the site can be attributed to mine collapses. It is unlikely that the Mississippian limestones that still retain a cover of Pennsylvanian shales and clay have been greatly affected by solutioning. However, it is possible that enlarged solution channels exist beneath the site. The Mississippian aquifer should be considered karst (Reference 31, page 3).

4.2 Groundwater Targets

There are no known drinking water wells within four miles of the site (Reference 23). The only recently drilled wells within the area were drilled for a heat pump system. Historic wells were drilled prior to 1945, and are assumed to no longer be in use (Reference 31, page 4). The City of St. Louis obtains its drinking water from the Mississippi and Missouri Rivers (Reference 17, page 46).

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4.3 Groundwater Sample Locations

No groundwater samples were collected, as there are no known drinking water wells within four miles of the site (Reference 23).

4.4 Analytical Results

No groundwater samples have been collected, therefore, no results are available.

4.5 Groundwater Conclusions

Groundwater in the St. Louis area is highly mineralized and not suitable for drinking water purposes. There are no known drinking water wells within four miles of the site. The area is karst, indicating that there is potential for contaminated surface water to infiltrate the groundwater.

5. SURFACE WATER PATHWAY

5.1 Hydrologic Setting

St. Louis is located in the Dissected Till Plains of the Central Lowland Province (Reference 45, page 5). Surface water flow enters the Mississippi drainage system (Reference 45, page 7).

The Hubert Wheeler State School site is located on a small topographic prominence. The drainage area is less than 50 acres (Reference 31, page 5). The site is not located in a floodplain (Reference 31, page 6). The River des Peres drainage is a natural groundwater discharge. This is not an area of deep groundwater recharge (Reference 31, attachment 9).

No surface water flow was observed during a site reconnaissance conducted by MDNR on June 30, 1994. A storm drain is located to the north of the asphalt playground (Reference 37). Surface water at the site would travel overland to a depressed area on the northeastern edge of the property for approximately 400 feet, then would enter a storm sewer drain west of Sublette Drive and south of I-44 (Reference 31, pages 4 and 5). There was no discoloration associated with the on-site storm drain (Reference 37).

The drain is estimated to be 1500 feet from the River des Peres, the main channel for the St. Louis City storm sewer system (Reference 31, pages 4 and 5). River des Peres enters the Mississippi River 9.2 miles downstream of the probable point of

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entry. The end of the 15-mile target distance limit is just south of Cliff County Cave Park, on the Missouri bank of the Mississippi River (Reference 4; Figure 2).

The River des Peres is also state-designated for livestock and wildlife watering and protection of warm water aquatic life and human health - fish consumption (Reference 18, page 85). The segment of the Mississippi River that lies along the 15-mile target distance limit is state-designated for irrigation, livestock and wildlife watering, protection of warm water aquatic life and human health - fish consumption, boating, drinking water supply, and industrial uses (Reference 18, page 76).

5.2 Surface Water Targets

•Drinking Water•

There are no known drinking water intakes along the 15-mile target distance limit. A drinking water intake for the City of St. Louis is located along the Mississippi River at the Chain of Rocks (Reference 15, pages 80 and 81; Reference 17, page 170). An intake is also located along the Illinois bank (Reference 16). Both of these intakes are upstream of the confluence of the River des Peres and the Mississippi. The segment of the Mississippi River that lies along the 15-mile target distance limit is state-designated for drinking water supply (Reference 18, page 76).

•Fishes•

Both the River des Peres and the Mississippi River are state-designated for the protection of warm water aquatic life and human health - fish consumption (Reference 18, pages 76 and 85). The Mississippi River is a commercial fishery.

•Sensitive Environments•

There is approximately one mile of wetland frontage along the Illinois bank of the Mississippi River, at the confluence of the Mississippi and Palmer Creek. This location is approximately 13.5 river miles downstream of the probable point of entry. Smaller wetlands may be present (Reference 4).

Sensitive species within the vicinity of the site have historically included the sicklefin chub, Macrhybopsis Meeki, and the auriculate false foxglove, Agalinis Auriculata. These species are candidates for federal listing and are state-listed Rare. Other state-listed species are noted within the area (Reference 12).

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5.3 Surface Water Sample Locations

As no surface water was present on-site during MDNR's site inspection sampling, no surface water samples were collected. Site drainage enters a storm drain to empty into the River des Peres, the storm water sewer for the City of St. Louis. Attribution of site contaminants to this site would prove difficult.

5.4 Analytical Results

No surface water samples were collected, therefore, no analytical results have been obtained.

5.5 Surface Water Conclusions

The River des Peres drains into the Mississippi River. There are no known drinking water intakes along the 15-mile target distance limit. No wetlands or sensitive environments are known to be located along River des Peres. At least one mile of wetland frontage is represented along the Mississippi River, and some sensitive environments were also noted. Both the River des Peres and the Mississippi River are state-designated for the protection of warm water aquatic life and human health - fish consumption. The Mississippi River is a commercial fishery.

As drainage from the site flows into the River des Peres, attribution of contaminants to this site would prove difficult. No surface water was observed to be flowing during MDNR's site visits (Reference 37; Photo log).

6. SOIL EXPOSURE AND AIR PATHWAYS

6.1 Physical Conditions

Soils in the St. Louis area were formed from silty fill material, loess and alluvium (Reference 5, General Soil Map). A layer of silty clay loess covers the uplands in this area. However, near drainages, this loess is eroded away. The thickness of the loess varies from 0 - 60 feet within the target area (Reference 31, page 1).

Boring logs of the top ten feet of soil indicate the fill material underlying the asphalt is a mix of sand, gravel, and brick. Cinders were noted in some areas of fill. Limestone cobbles and silty clays were also represented (Reference 7, pages 34-44).

Clay mining was once prominent in this area. Abandoned clay mines are located in the vicinity of Midge Berra Park. Additional information about clay mining in St. Louis

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can be found in Clay Deposits, Missouri Geological Survey Volume XI, written by H.A. Wheeler (Reference 31, attachments A and 5).

The Hubert Wheeler State School property is approximately 4 acres in size. The asphalt playground is 72.5 feet by 101.5 feet (Reference 39). Contamination has been found to extend to a depth of at least ten feet below ground surface (Reference 31, page 4). The area of known contamination is partially covered by an asphalt cover less than 6 inches in depth. The asphalt is cracked and does not provide an impenetrable cover (Reference 7, pages 34-44).

The asphalt playground was formerly used by the physical education teacher to improve the childrens' ball handling skills. The asphalt was also used for riding tricycles. Sometimes the children were taken to the grassy area on the eastern side of the asphalt playground (Reference 30). A second playground area, with a swing set, is located on the opposite side of the school, to the east (Reference 43).

6.2 Soil and Air Targets

The Hubert Wheeler State School is a school for severely developmentally disabled students. The school has a student enrollment of 110 and 54 staff members (Reference 8, page 14; References 25 and 41). Six administrative staff members of the State Schools for the Severely Handicapped also have offices in the building (Reference 41).

Many of these students have severe mobility limitations requiring wheelchairs, walkers, or braces. These children would be more likely to sit on the ground for long periods of time if not moved by staff, potentially exposing them to contamination for longer periods of time. In addition, pica, the craving or tendency to eat non-food items, is found more frequently in student populations with developmental disabilities. Rocks, metal parts, paper, grass, and dirt are commonly ingested items. Developmentally disabled and physically challenged students also have more frequent and severe health problems than would be expected in a mainstream student population. Some of the students may have other medical problems that may make them more susceptible to environmental factors (Reference 19).

At least five residential properties border the school to the northeast; eight to the southeast. Deaconess Hospital borders the asphalt playground area. People were

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observed in the parking lot of the hospital, within 200 feet of the asphalt playground (Reference 37).

Approximately 761,222 people live within a four mile radius of the site (Reference 13). There are more than 75 schools located within four miles of the site. Vigo Park, Clifton Park, and Frisco Park are located within one-half mile of the site. Tower Grove Park, Lindenwood Park, Tilles Park, Forest Park (including the St. Louis Science Center, the Municipal Theater and the Art Museum), and the Missouri Botanical Garden are located within one to two miles of the site (Reference 4).

Sensitive species within the vicinity of the site have historically included the auriculate false foxglove, Agalinis Auriculata, a candidate for federal listing and state-listed rare. Other state-listed species are noted within the area (Reference 12).

6.3 Soil and Air Sample Locations

MDNR conducted site inspection sampling on Hubert Wheeler State School property on July 7, 1994. Six samples were collected from the top two feet of soil. Four samples were collected in the vicinity of the asphalt playground on the western side of the school and two were collected from the eastern side of the school (Reference 43; **Table 2a**).

6.4 Soil and Air Analytical Results

Detectable levels of benzo(a)anthracene, chrysene, fluoranthene, phenanthrene and pyrene were found in all six samples. One of the soil samples, collected nine feet west of the asphalt play area, exceeded both three times the background sample and the site screening standard for the parameter benzo(a)pyrene, one of the carcinogenic polynuclear aromatic hydrocarbons. Additional results may be found in **Table 2b**.

Previous sampling results indicate that carcinogenic compounds are present in the soil underlying the asphalt playground at levels which exceed health-based benchmarks. Additional sampling conducted by Geotechnology and MDNR confirms that this contamination is not limited to the asphalt playground. Detectable levels of contamination can be found within the top foot of soil surrounding the school. A true background sample - one that does not reveal this type of contamination - has not been collected, indicating that the horizontal and vertical extent of contamination have yet to be defined.

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6.5 Soil Exposure and Air Pathway Conclusions

Sampling results indicate that carcinogenic compounds are present in the soils underlying and surrounding the asphalt playground at levels which exceed health-based benchmarks for several carcinogenic compounds. The asphalt playground was formerly used as a ball-handling area by the children of the school. Cracks and fissures are visible in the asphalt surface, potentially exposing the children to both soil and air contamination (References 2 and 7). There are indications that this type of exposure has occurred (Reference 39). Children attending the Hubert Wheeler State School are more likely to be susceptible to on-site contamination than children attending mainstream elementary schools, due to their limited mobility and behaviors such as pica (Reference 19).

7. SUMMARY AND CONCLUSIONS

•SUMMARY•

The Hubert Wheeler State School is a school for severely developmentally disabled students. Sampling results indicate that carcinogenic compounds are present within the top two feet of soil surrounding the school. The highest levels of contamination have been detected beneath the asphalt playground of the school. Cracks and fissures are visible in the asphalt surface, which may expose the children and staff of the school to both soil and air contamination. The school has a student enrollment of 110 and 60 staff and faculty members. All but six administrative staff members have been relocated. Approximately 761,222 people live within a four mile radius of the site. There are more than 75 schools and seven parks located within four miles of the site.

•Groundwater•

Groundwater in the St. Louis area is highly mineralized and not suitable for drinking water purposes. No drinking water wells are known to be present within four miles of the site. The area is karst, indicating that there is potential for contaminated surface water to infiltrate the groundwater.

•Surface Water•

Drainage from the site flows into the River des Peres, a channelized river in the City of St. Louis, and enters the Mississippi River. There are no known drinking water intakes along the 15-mile target distance limit. One mile of known wetland frontage is represented along the Mississippi River.

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Sensitive species within the vicinity of the site have historically included the sicklefin chub, Macrhybopsis Meeki, and the auriculate false foxglove, Agalinis Auriculata. These species are candidates for federal listing and are state-listed rare. Other state-listed species are noted within the area (Reference 12).

Both the River des Peres and the Mississippi River are state-designated for the protection of warm water aquatic life and human health - fish consumption. The Mississippi River is a commercial fishery.

•Soil and Air•

Sampling results indicate that carcinogenic compounds were detected in the soil underlying the asphalt playground. Benzo(a)pyrene was detected in the tar-like substance (32,000 ppm) and surficial soil (2 ppm) at levels which exceed the Superfund PA/SI site screening standard of .08 ppm benzo(a)pyrene. Cracks and fissures in the asphalt surface may have exposed the 110 students and 60 staff and faculty members to contamination via the soil and air pathways.

The students at the Hubert Wheeler State School are more likely to be exposed to contamination than mainstream school children, due to their limited mobility and a higher frequency of pica behavior. These students are also more likely to be susceptible to environmental factors, due to their physical limitations.

•CONCLUSIONS•

The Hubert Wheeler State School site is currently under evaluation by the Division of Elementary and Secondary Education (DESE) through their consultant, Geotechnology. Additional investigative actions are planned. Further actions, including an expanded site inspection and/or a removal action, may be warranted at this site.

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REFERENCES

1. U.S. Environmental Protection Agency Hazard Ranking System, 40 CFR Part 300, Appendix A, 55 FR 51583, December 14, 1990.
2. U.S. Environmental Protection Agency, June 1994 Superfund Chemical Data Matrix.
3. Latitude & Longitude Calculation Worksheet. From U.S. EPA Guidance for Performing Preliminary Assessments Under CERCLA, September 1991.
4. U.S. Geological Survey, 7.5-minute topographic quadrangle maps of Missouri: Cahokia (east map), 1954, photorevised 1968 and 1974; Clayton (north map), 1954, photorevised 1968 and 1974; Granite City (northeast map), 1954, photorevised 1968 and 1974; Webster Groves, 1954, photorevised 1968 and 1974, photoinspected 1979; Oakville, 1991.
5. DGLS. MDNR. Missouri Water Atlas. 1986, revised from 1982. 100 pages.
6. U.S. Department of Agriculture. Soil Survey of St. Louis County and St. Louis City, Missouri. April 1982. 137 pages.
7. Alizadeh, P.E., Ed. Geotechnology. Transmittal letter to Gerald Bonnot, State of Missouri with draft Subsurface Assessment, Playground Site Restoration, Hubert Wheeler State School and other enclosures. Letter dated November 30, 1993, report dated October 4, 1993. 114 pages (total).
8. School Data Section, DESE. Missouri School Directory, 1993-94. October 1993. 234 pages.
9. Bloss, Julie. HWP, DEQ, MDNR, Jefferson City. Telephone record for Hubert Wheeler State School dated February 2, 1993.
10. MDNR, Jefferson City. Missouri Water Quality Basin Plans, Volume 5. 76 pages.

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11. Bloss, Julie. HWP, DEQ, MDNR, Jefferson City. Telephone record for Future Action at the Hubert Wheeler State School dated November 12, 1993. 2 pages.
12. Brabander, Jerry J., U.S. Fish and Wildlife Service, Columbia. Letter to Edwin Knight, MDNR, dated June 14, 1993.
13. U.S. Department of Commerce. Selected Population and Housing Characteristics: 1990. St Louis City, and St. Louis County, Missouri.
14. (reserved for) Missouri State Census Data Center. 1990 Missouri Census Tract Outline Maps. October 1992. 31 pages.
15. MDNR, DGLS, Rolla. Missouri Water Atlas. 1986, revised from 1982. 100 pages.
16. Cobb, Richard P. Illinois Environmental Protection Agency. Letter to Edwin D. Knight, MDNR. March 24, 1992.
17. MDNR, Public Drinking Water Program. Census of Missouri Public Water Systems 1991. 181 pages.
18. Missouri Code of State Regulations, 10 CSR 20-7.031. Water Quality Standards, Jefferson City. January 3, 1992.
19. Davidson, Kristine. HWP, DEQ, MDNR, Jefferson City. Memo regarding Hubert Wheeler State School Preliminary Assessment. December 21, 1993.
20. Bloss, Julie A. HWP, DEQ, MDNR, Jefferson City. Phone log regarding Drinking water intakes along the Mississippi River. December 28, 1993.
21. Bloss, Julie A. HWP, DEQ, MDNR, Jefferson City. Phone log regarding Possible sources of coal tar contamination at the Hubert Wheeler State School. December 28, 1993.
22. Bloss, Julie A. HWP, DEQ, MDNR, Jefferson City. Memo regarding Notes made by Superfund staff; October 7, 1993 site visit. January 4, 1994.

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23. Eck, R. Regional Director, St. Louis Regional Office, MDNR. Memo regarding Public Drinking Water Sources in the Vicinity of PA/SI Sites.
24. ATSDR, U.S. Department of Health and Human Services. Draft Toxicological Profile for Polycyclic Aromatic Hydrocarbons. October 1993. 273 pages, appendices.
25. Bloss, Julie A. HWP, DEQ, MDNR, Jefferson City. Memo regarding Number of Staff Members at Hubert Wheeler State School. January 7, 1994.
26. U.S. Department of Commerce. Rainfall Frequency Atlas of the United States. Technical paper No. 40. 1961.
27. Roberts, Daryl W. Chief, BEE, MDOH, Jefferson City. Letter to Edwin D. Knight dated December 16, 1993. 2 pages.
28. Shorr, David A. Director, MDNR, Jefferson City. Letter to Robert Bartman dated January 3, 1994.
29. Hatheway, Allen W. Professor of Geologic Engineering, UMR. Letter to Ms. Julie Bloss regarding Coal Tar Site at 5707 Wilson Ave., St. Louis. 2 pages.
30. Bloss, Julie A. HWP, DEQ, MDNR, Jefferson City. Memo regarding Site Visit to Hubert Wheeler State School. January 27, 1994. 2 pages.
31. Starbuck, Edith. Environmental Geology Section, DGLS, MDNR, Rolla. Memo regarding Hubert Wheeler State School Site. February 9, 1994. 8 pages, attachments.
32. Bloss, Julie A. HWP, DEQ, MDNR, Jefferson City. Phone log regarding Sampling at Hubert Wheeler State School site. March 2, 1994. 2 pages.
33. Allen, Brian. ESP, DEQ, MDNR, Jefferson City. Phone log regarding Phase II Site Investigation. March 14, 1994.

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34. Kavanaugh, James L. HWP, DEQ, MDNR, Jefferson City. Memo to Larry Alderson regarding Previous and Current Sampling at Hubert Wheeler State School site. March 11, 1994. 8 pages.
35. Alizadeh, Ed D. Geotechnology, Inc. Revised Proposal, Geophysical Site Survey and Phase 2 Site Restoration, Hubert Wheeler State School, 5707 Wilson Avenue, St. Louis, Missouri. March 16, 1994. 9 pages.
36. Starbuck, Edith. Environmental Geology Section, DGLS, MDNR, Rolla. Memo to Julie Bloss regarding Sanborn Maps for Carondolet Coke and Hubert Wheeler sites. June 15, 1994. 6 pages.
37. Bloss, Julie A. HWP, DEQ, MDNR, Jefferson City. Conference log regarding Site Visit to Observe Magnetometer Survey by Geotechnology. June 30, 1994. 2 pages.
38. Allen, Brian. ESP, DEQ, MDNR, Jefferson City. Site Inspection Sampling Plan for Hubert Wheeler State School Site. July 5, 1994. 4 pages, appendices.
39. Littich, Ron. DESE. Selected materials from the DESE Hubert Wheeler State School property and project files. August 11, 1994. x pages.
40. Robinson, Melanie. St. Louis Post-Dispatch. "Contaminants Close Wheeler State School, Tar-Like Substance Oozing on Playground". August 20, 1994. 1 page.
41. DESE. News release. Wheeler State School closed pending further tests for chemical contaminants. August 19, 1994. 2 pages.
42. McPheron, Wanda. State Schools for the Severely Handicapped, DESE. Letter to parents and staff of Hubert Wheeler State School and Gateway State School dated August 17, 1994.
43. Allen, Brian. ESP, DEQ, MDNR, Jefferson City. Site Inspection Sampling Report for Hubert Wheeler State School Site. August 23, 1994. 5 pages, appendices.

**Hubert Wheeler State School
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44. Geotechnology. Site Assessment Review Summary. August 10, 1994. 12 pages.
45. Gosselin, Robert E., Smith, Roger P., Hodge, Harold C., with the assistance of Braddock, Jeannette E. Clinical Toxicology of Commercial Products. Fifth Edition. 1981.
46. Bloss, Julie A. HWP, DEQ, MDNR, Jefferson City. Memo to file regarding Possible Sources of Tar Contamination. September 16, 1994. 5 pages.

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**Table 1
HUBERT WHEELER STATE SCHOOL SITE**

Highest Values of Contamination Which Exceed MDOH Any-Use Soil Levels				
Composite soil sampling conducted by Geotechnology for DESE				
Parameter	August 1993 1-10 foot depth	June 1994 0-6 inch depth	Superfund PA/SI Site Screening Benchmark	MDOH Any- Use Soil Level (1993)
Benzo(a) anthracene	45.0 ppm	7.1 ppm	----	0.44 ppm
Chrysene	54.0 ppm	7.2 ppm	17000 ppm	0.44 ppm
Benzo(b) fluoranthene	62.0 ppm	6.5 ppm	----	0.44 ppm
Benzo(k) fluoranthene	29.0 ppm	4.7 ppm	----	0.44 ppm
Benzo(a) pyrene	41.0 ppm	6.0 ppm	0.08 ppm	0.44 ppm
Dibenzo(a,h) anthracene	6.0 ppm	1.2 ppm	----	0.44 ppm

All data taken from References 2, 7, and 44.

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Table 2a HUBERT WHEELER STATE SCHOOL SITE SITE INSPECTION SAMPLING RATIONALE		
Sample Number	Sample Type	Location and Objectives
94-1705	Soil	Grab from 0-1 foot depth from area 7 feet north of the concrete pad and 5 feet east of the eastern edge of the asphalt play area; sample collected to determine vertical extent of soil contamination
94-1706	Soil	Duplicate of 94-1705; collected as part of quality assurance/quality control
94-1707	Soil	Grab from 0-1.5 foot depth from area north of the northwest fencepost surrounding the asphalt play area; sample collected to determine vertical extent of soil contamination
94-1708	Soil	Grab from 0-2 foot depth from area 9 feet west of the western edge of the asphalt play area; sample collected to determine vertical extent of soil contamination
94-1709	Soil	Grab from 0-1 foot depth from grassy play area's northern side; collected for use as on-site human soil exposure target sample, but used as background sample after analyses found contamination in the background sample
94-1710	Soil	Grab from 0-1 foot depth from area 20 feet north of the northeastern corner of the school gymnasium; sample collected as background
94-1711	Source	Grab of tar-like material collected from ground surface where it oozes from the subsurface; collected as a source sample

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Table 2b
HUBERT WHEELER STATE SCHOOL SITE
SITE INSPECTION SAMPLING DATA

Sampling Parameters	Sample identification numbers - Samples collected by MDNR on July 7, 1994							
	94-1705	94-1706	94-1707	94-1708	BKGD 94-1709	94-1710	94-1711	SCDM Benchmarks
Arsenic (total)	11	1.1	5.19	10.1	8.68	9.93	3.01	170
Barium (total)	77.8	70	108	125	96.2	111	ND	41000
Cadmium (total)	1.22	0.545	1.24	1.44	1.05	2.02	1.25	290
Chromium (total)	12.2	10.7	15.8	19.1	17.6	20.9	ND	2900
Mercury (total)	0.123	0.149	ND	0.041	0.049	0.086	ND	170
Lead (total)	65.7	54.5	60	92.8	59	85.3	42.7	-----
Selenium (total)	0.586	ND	ND	ND	0.53	2.28	1.993	2900
All VOAs	ND	ND	ND	ND	ND	ND	ND	
All Acid Extractables	ND	ND	ND	ND	ND	ND	ND	
Acenaphthene	ND	0.43	ND	0.31	ND	0.037	7200	35000
Acenaphthylene	ND	ND	ND	ND	ND	0.046	ND	-----
Anthracene	ND	1.5	0.22	0.71	ND	0.13	14000	170000
Benzo(a)anthracene	2.7	3.5	0.55	1.1	0.25	0.57	14000	-----
Benzo(a)pyrene	ND	ND	ND	2	ND	0.56	32000	0.080
Benzo(b)fluoranthene	ND	3.0	0.42	1.3	ND	0.53	22000	-----
Benzo(ghi)perylene	ND	ND	ND	1	ND	ND	1200	-----

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Table 2b
HUBERT WHEELER STATE SCHOOL SITE
SITE INSPECTION SAMPLING DATA

Sampling Parameters	Sample identification numbers - Samples collected by MDNR on July 7, 1994							
	94-1705	94-1706	94-1707	94-1708	BKGD 94-1709	94-1710	94-1711	SCDM Benchmarks
Benzo(k) fluoranthene	ND	<u>4.8</u>	0.83	1.4	ND	0.83	<u>22000</u>	-----
Chrysene	<u>4.4</u>	<u>4.0</u>	0.76	<u>1.3</u>	0.36	0.66	<u>17000</u>	-----
Dibenzo(a,h) anthracene	ND	ND	ND	0.47	ND	ND	<u>11000</u>	-----
Dibenzofuran	ND	ND	ND	0.128	ND	0.019	<u>4200</u>	-----
Diethylphthalate	ND	0.26	ND	NA	NA	NA	NA	470000
Fluoranthene	<u>6.9</u>	<u>9.3</u>	1.4	<u>4</u>	0.65	1.2	<u>47000</u>	23000
Fluorene	ND	0.43	ND	0.23	ND	0.030	<u>7300</u>	23000
Indeno(1,2,3-cd) pyrene	ND	1.4	ND	1.4	ND	ND	<u>20000</u>	-----
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	<u>1000</u>	-----
Naphthalene	ND	ND	ND	0.05	ND	ND	<u>1800</u>	-----
Phenanthrene	<u>4.7</u>	<u>4.8</u>	0.67	<u>2.5</u>	0.32	0.5	<u>28000</u>	-----
Pyrene	<u>7</u>	<u>7.4</u>	1.2	<u>3.2</u>	0.5	1.2	<u>28000</u>	17000

ND = non-detect

NA = not analyzed

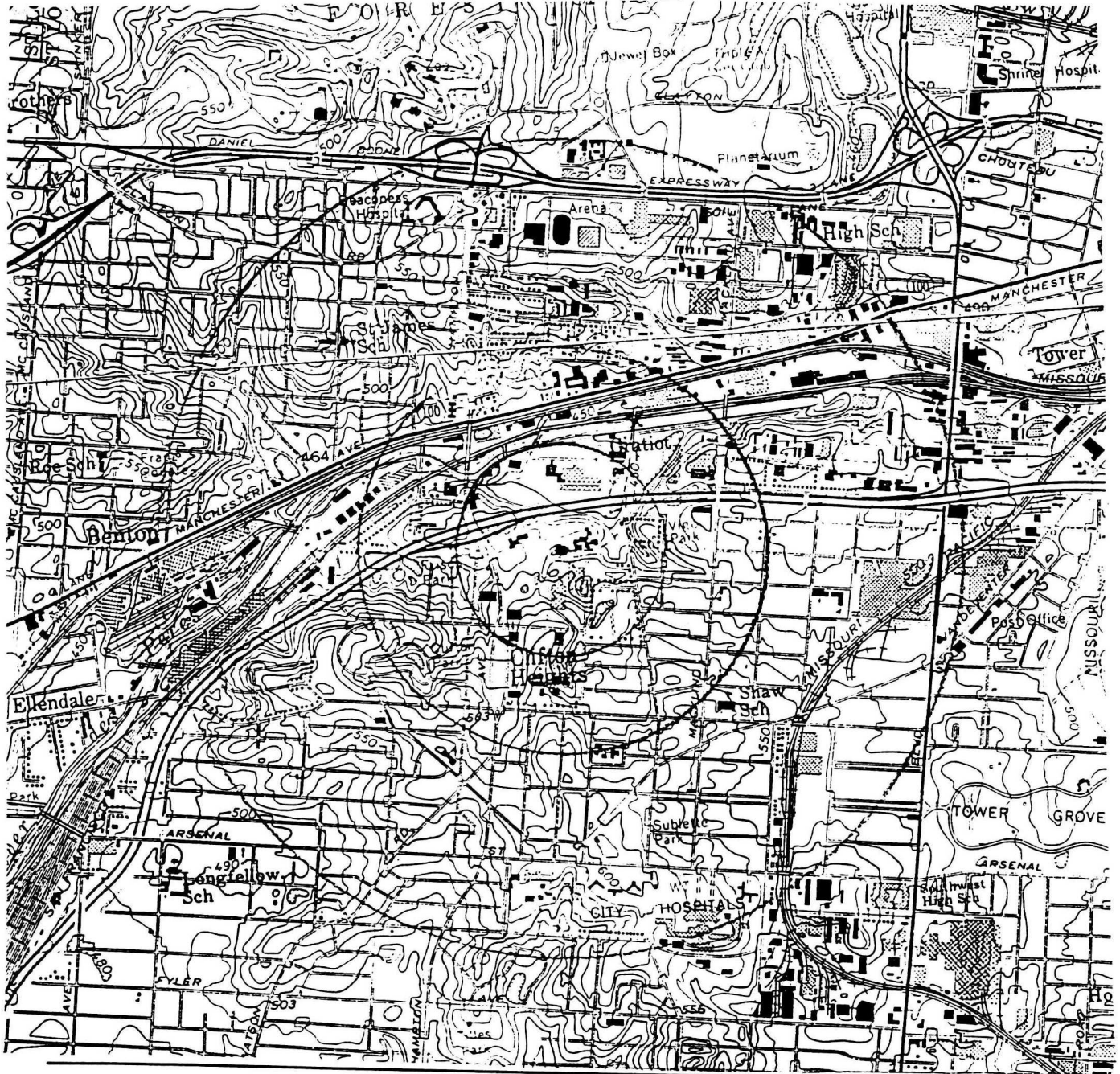
Highlighted values are 3x "Background" and above SCDM Benchmarks

Underlined values are 3x "Background"

All sampling results in parts per million (ppm).

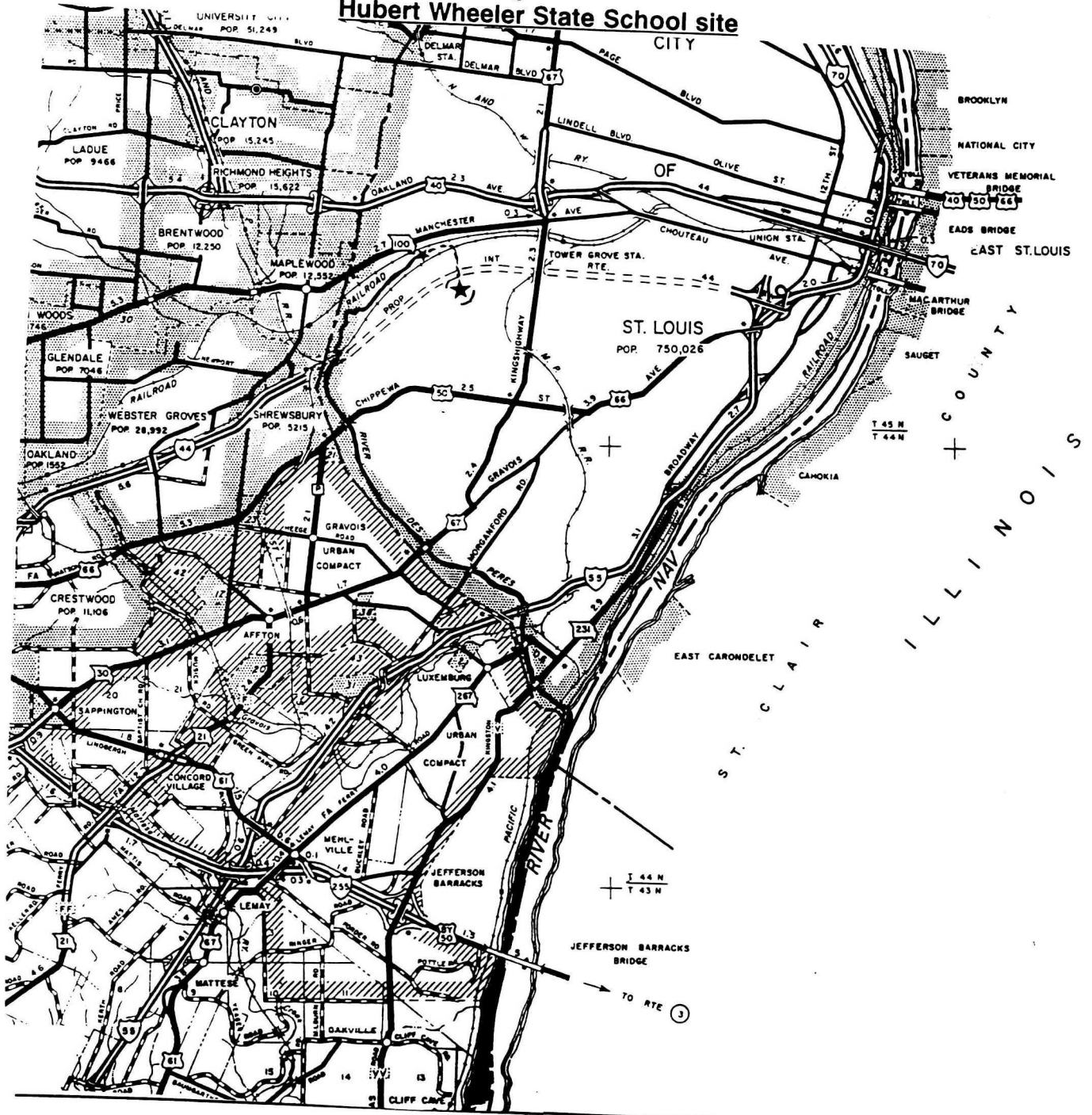
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Figure 1
Hubert Wheeler State School site
Site and 1 mile radius



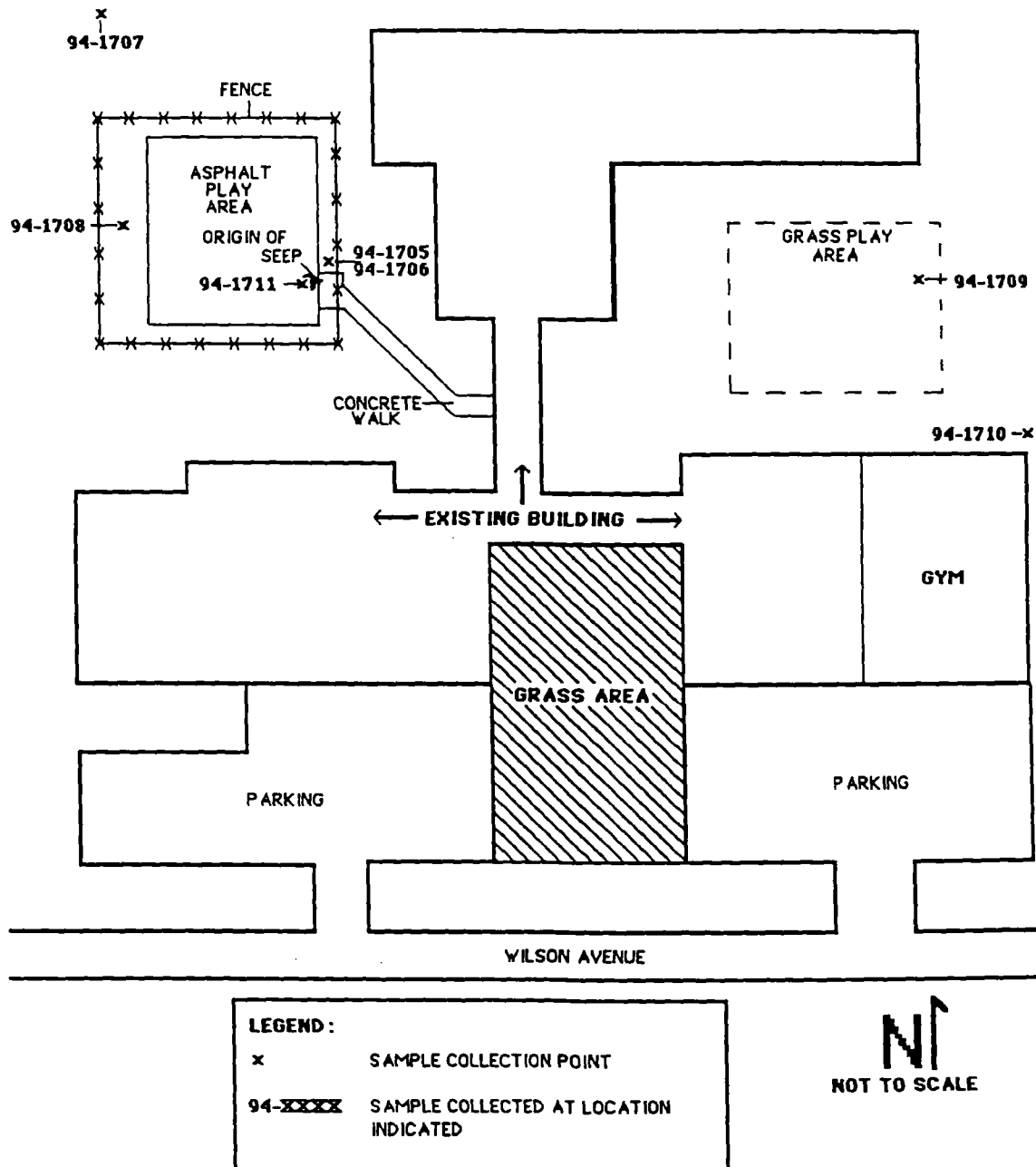
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Figure 2
Hubert Wheeler State School site



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Figure 3
Hubert Wheeler State School site
MDNR Site Sampling Locations



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Figure 4
Hubert Wheeler State School site
Generalized well log

Hubert Wheeler State School Site Stratigraphy			
Stratigraphic Unit	Composition	Thickness (ft.)	Remarks
Fill	Clay with brick, gravel and cinders	5 - 15	
Loess	Silty clay	0 - 20	
Pennsylvanian System	Shales, clays, sandstones, coals	50 - 60	Coal and clay mined
Mississippian System	Silty to sandy limestone, cherty limestone	900 +	Small yields of water at shallow depths